

(31) 9909562

**(32) 26.04.1999**

(33) GB

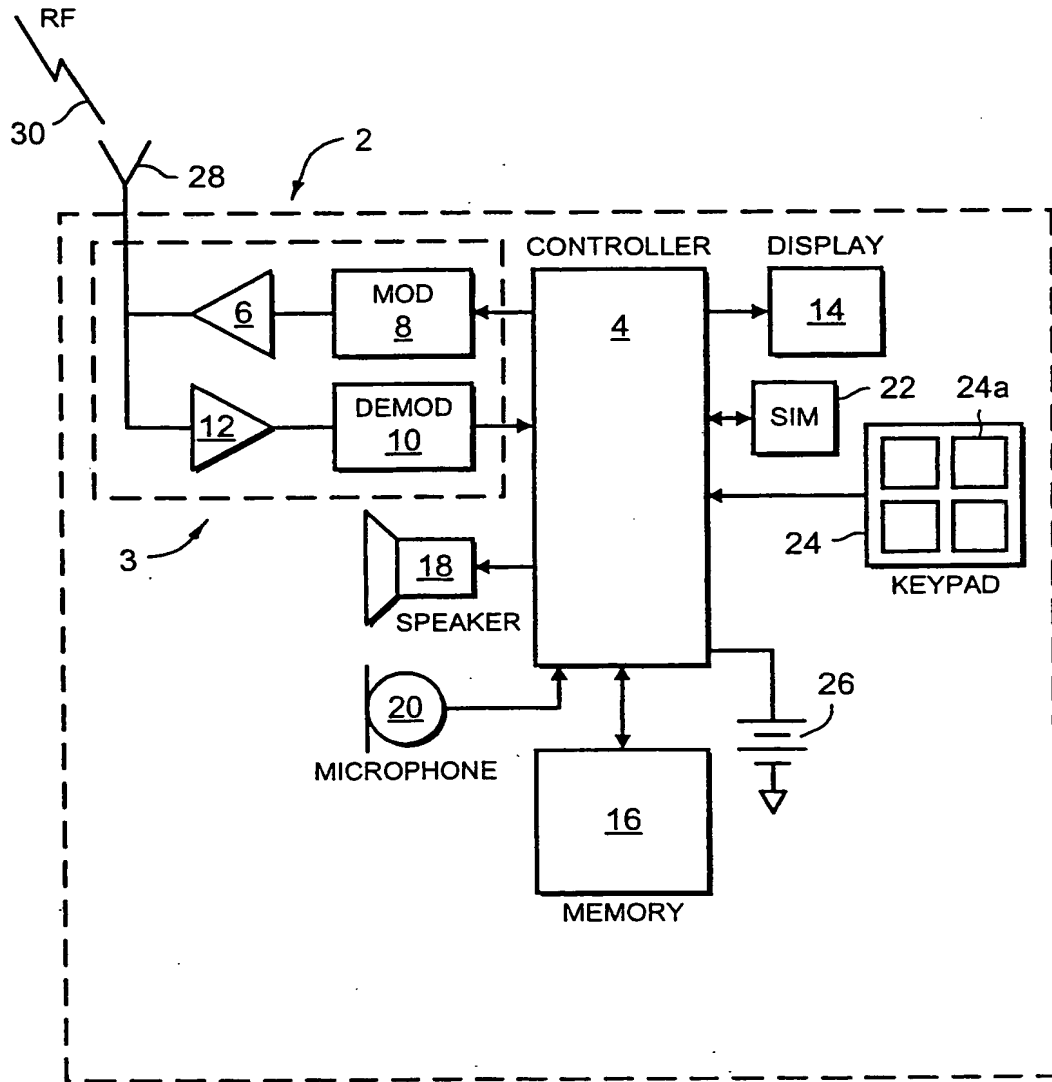


FIG. 1

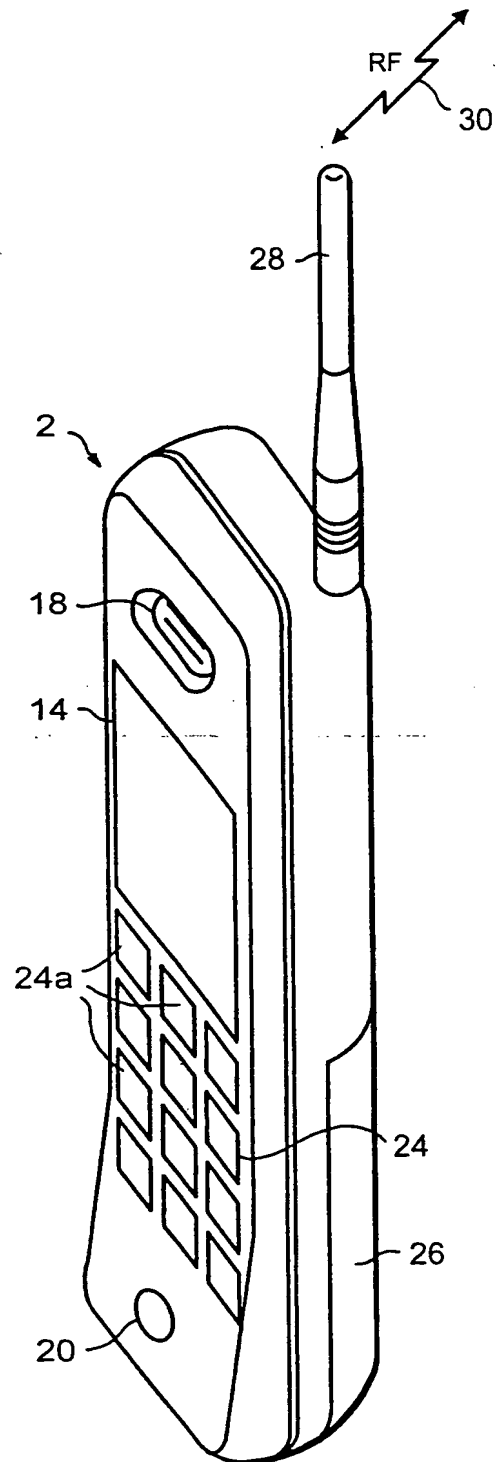


FIG. 2

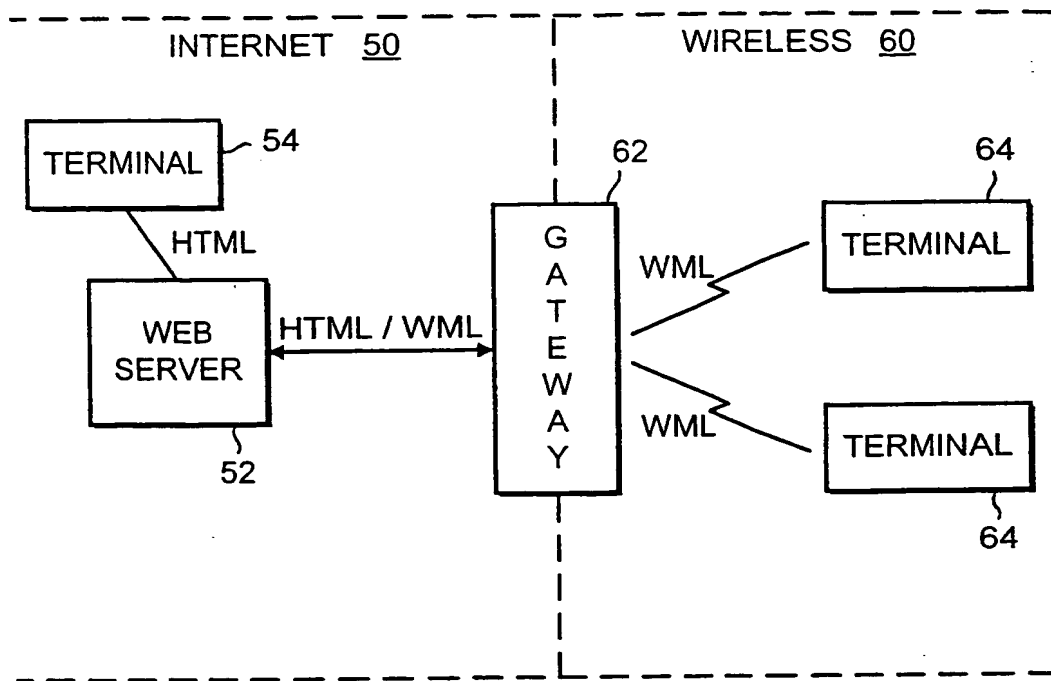


FIG. 3

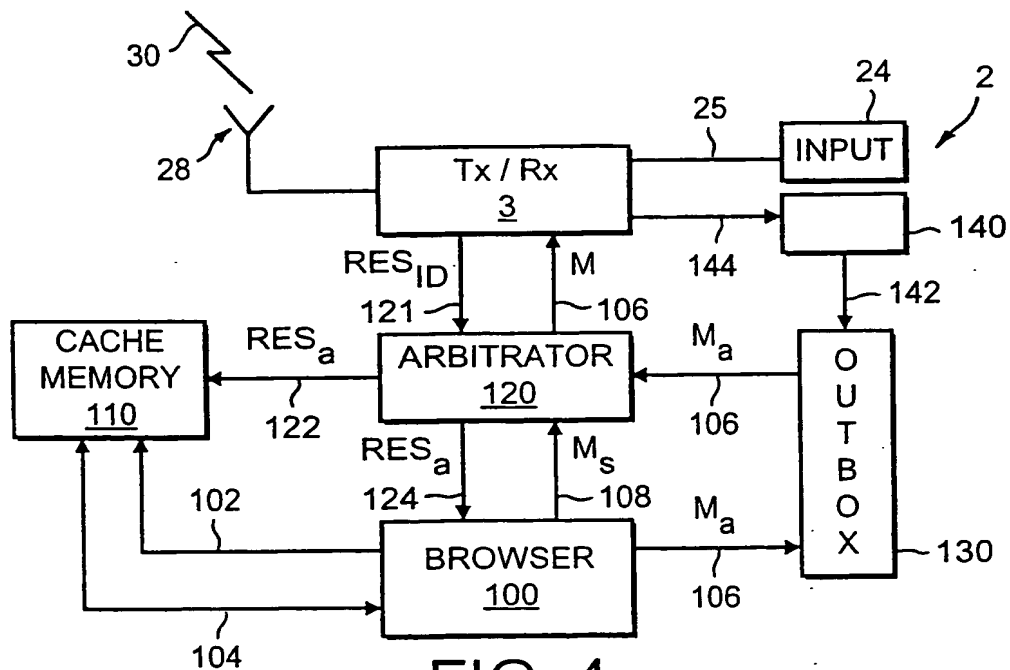


FIG. 4

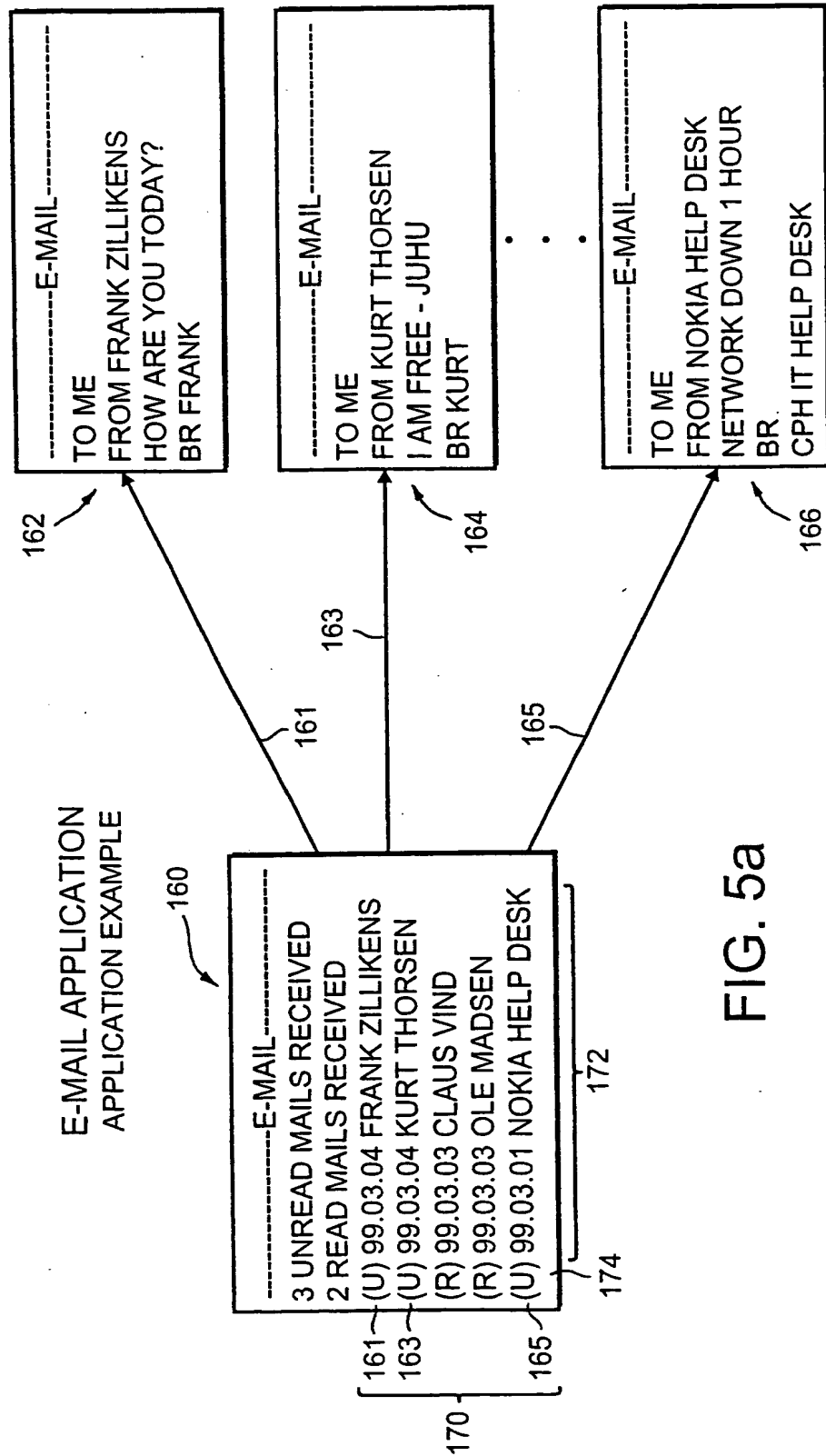


FIG. 5a

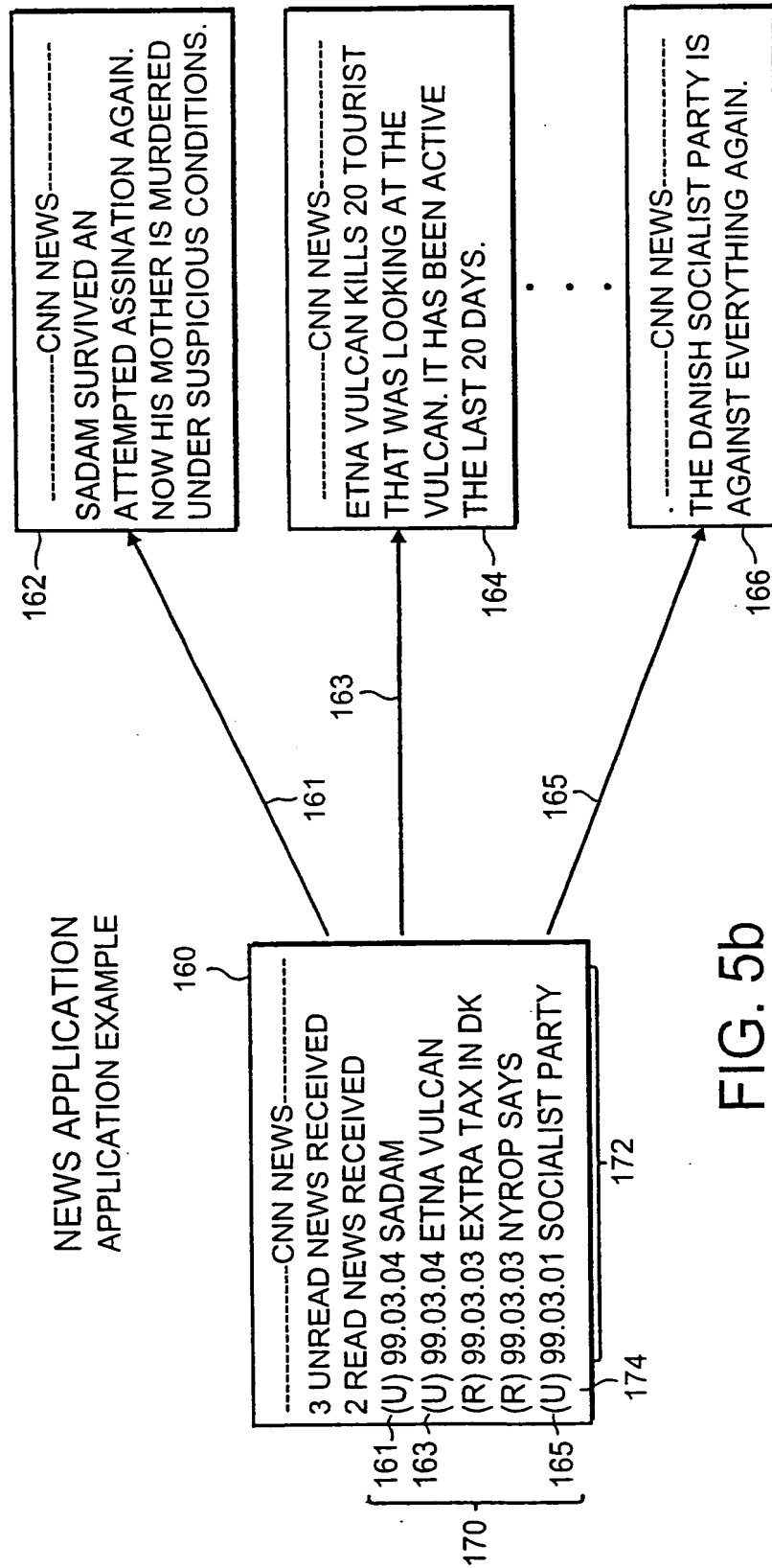


FIG. 5b

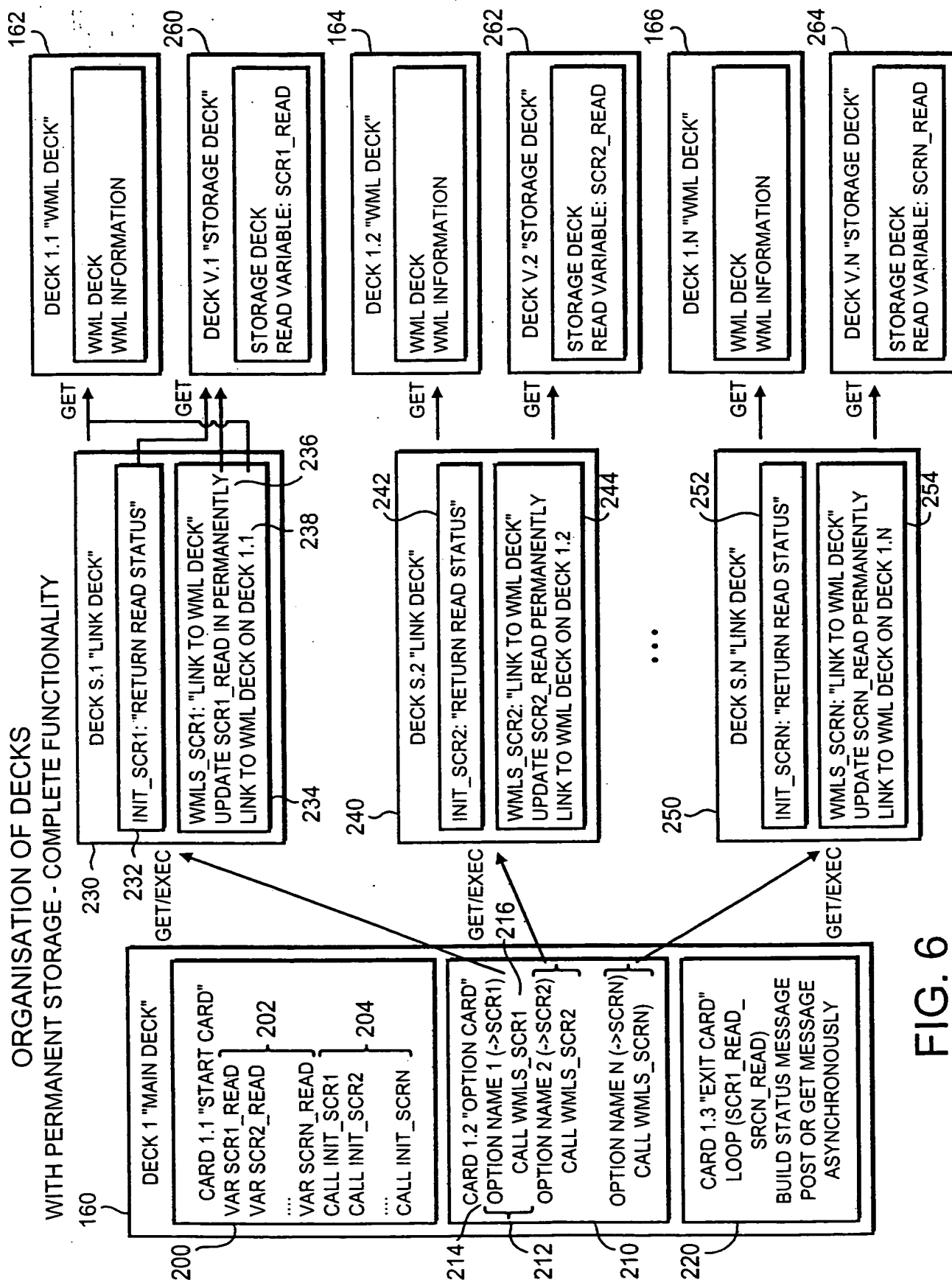


FIG. 6

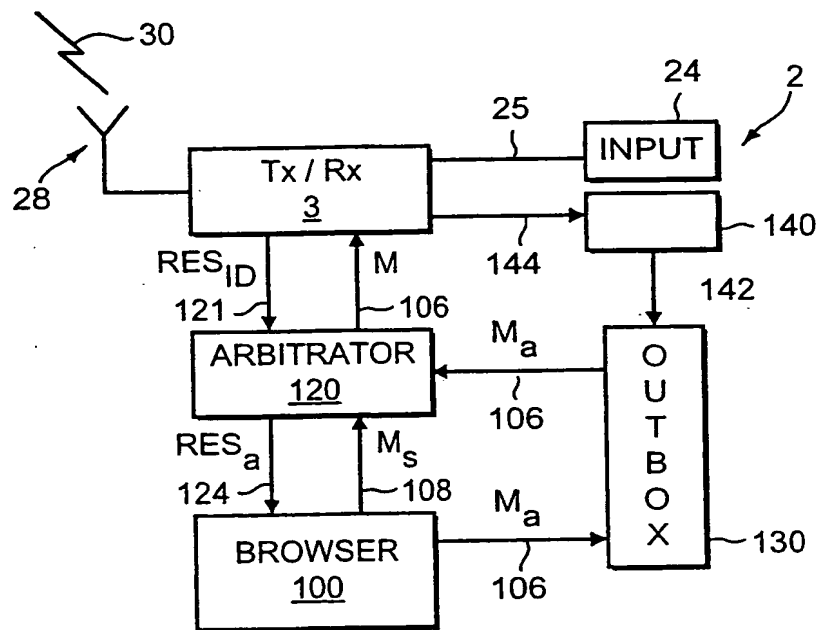


FIG. 7



# ORGANISATION OF DECKS WITHOUT PERMANENT STORAGE AND CACHE

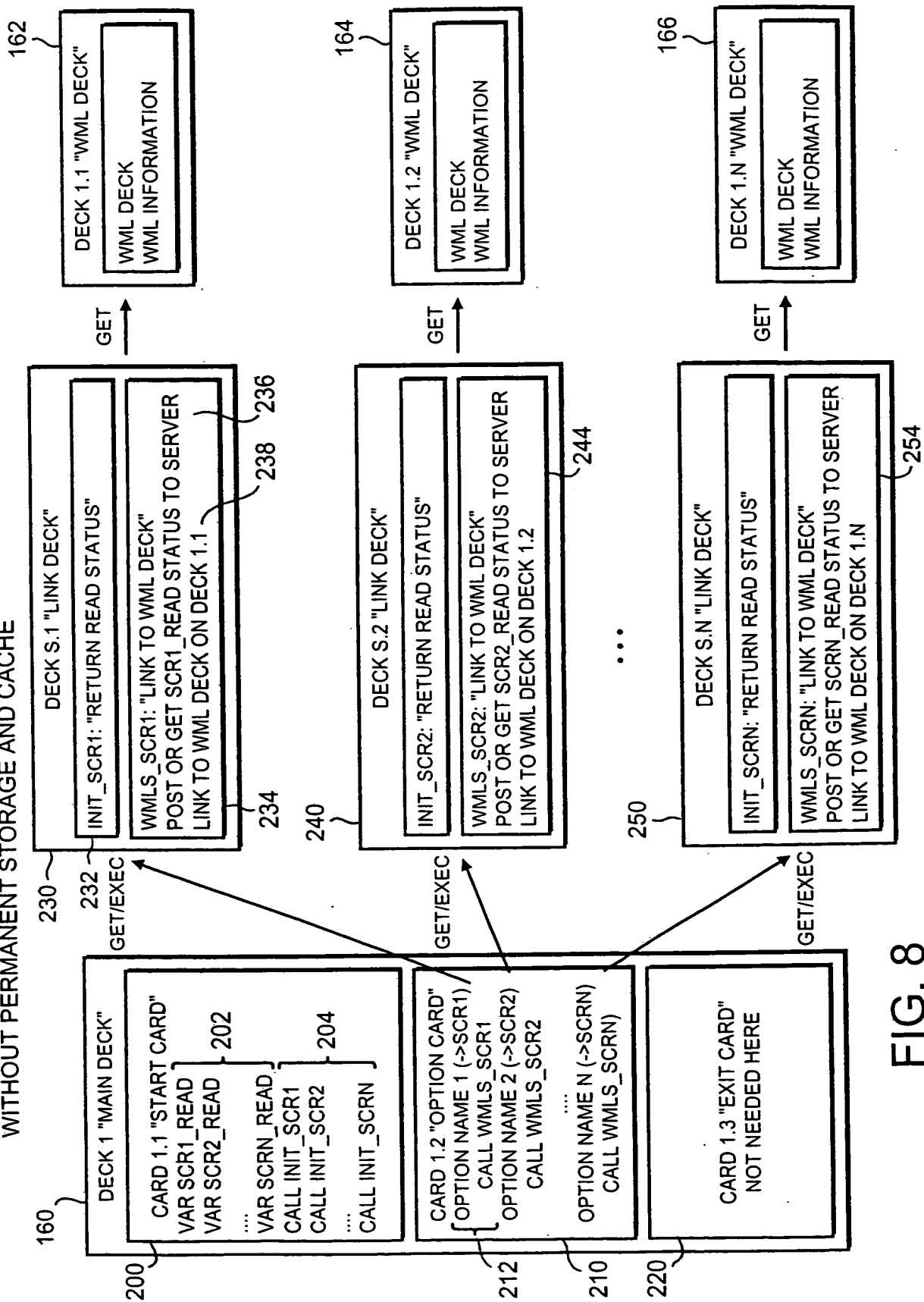


FIG. 8

## A radio terminal

The present invention relates to a radio terminal for browsing the Internet. It particularly relates to increasing the functionality of such a terminal by  
5 transferring content from a server.

Mobile phones are becoming widely used as they provide security, mobility and flexibility. Recently the popularity of the Internet has increased among the general population. The Internet can be browsed using a so-called browser  
10 application, which provides an easily usable visual interface. It would be particularly desirable to combine the hand held nature of a mobile phone and its associated portability with the ability to browse the Internet. The wireless application protocol (WAP) has been developed with this purpose in mind. It allows a radio handset to communicate with a transceiver at an internet  
15 gateway and accesses the internet through a radio link. A Wireless Application Environment which forms a upper layer of the WAP stack includes a microbrowser. The browser uses wireless mark-up language (WML) and a lightweight mark-up language, WMLScript a lightweight scripting language. WML implements a card and deck metaphor. The interaction of the browser  
20 and user is described in a set of cards which are grouped together into a document commonly referred to as a deck. The user navigates to a card in a deck reviews its content and then navigates to another card in the same deck or in a different deck. Decks of cards are transferred from origin servers as needed.

25

A desktop computer or the like, has until now been the standard device for accessing the World Wide Web. The computer generally has a display, a cursor control and selecting device such as a mouse and a keyboard. When using a device to browse the World Wide Web, the device generally  
30 exchanges information with the Internet gateway over a fixed high band-width link. The device acts as a client and the Internet as a server. The browser can

According to one aspect of the present invention there is provided a system comprising at least one terminal and a server in radio communication therewith, the terminal comprising:

5 a transceiver arranged to send radio packets to and receive radio packets from the server;

a browser application for displaying content, arranged to initiate a first application by accessing a first item associated with the first application using a first content identifier, the application being provided by the combination of the first item and further items each of which is accessible using an individual  
10 content identifier, and each of which comprises content or means for linking to content; and

a user interface connected to the browser having a display for displaying content and user input means,

the server having a transceiver for sending and receiving radio packets from  
15 the terminal

and storage means for storing content, accessible for transfer to the terminal, the stored content comprising the first item accessible using the first content identifier and the further items, each of which is accessible using their individual content identifiers, and each of which comprises content or means  
20 for linking to content, the first item on transfer to the terminal having:

identifying means for identifying to the browser the content identifiers of the further items; and

link means for automatically providing a link from the first item to each of a plurality of further items each link using an individual content identifier,  
25 wherein activation of the links provides for access to the further items and thereby the functionality of the first application, wherein the server is arranged to asynchronously transfer the first item to the terminal.

According to another aspect of the present invention there is provided a  
30 system comprising at least one terminal and a server in radio communication therewith, the terminal comprising:

a receiver arranged to receive radio packets from the server;

identifying means for identifying to the browser the content identifiers of the further items; and

link means for automatically providing a link from the first item to each of a plurality of further items each link using an individual content identifier, wherein activation of the links provides for access to the further items and thereby the functionality of the first application, wherein the server is arranged to asynchronously transfer the first item to the terminal.

According to a still further aspect of the present invention there is provided a method of providing the functionality of an application in a browser of a terminal by creating a hierarchy of inter-linked items by transferring the items over a radio link from a server, wherein entrance to said hierarchy is through a first item, accessible through the browser using a first content identifier, the first item identifying further items in the hierarchy accessible through the browser using content identifiers and providing for links to the further items using the content identifiers, comprising the steps of:

initiating the application in the terminal by accessing the first item using its content identifier through the browser

transferring the first item from the server to the terminal

using the content identifiers of the further items in the first item to transfer the further items from the server to the terminal and

creating links between the first item and the further items, whereby the functionality of the application arises from activation of the links.

25

For a better understanding of the present invention and to understand how the same may be brought into effect reference will now be made by way of example only to the accompanying drawings in which:

Figures 1 and 2 schematically illustrate a radio handset ;

Figure 3 illustrates a network for accessing the Internet;

transmits and receives radio frequency signals via the antenna 28. The fundamental functions of the terminal 2 are provided by the combination of the controller 4 and the memory 16.

- 5 The terminal 2 has a number of fundamental capabilities including system capabilities relating to radio communication. The terminal when functioning as a phone will use standard communication protocols such as GSM, AMPS etc and when functioning as an internet terminal will use the wireless applications protocol (WAP). The WAP protocol provides for a web browser.

10

- Figure 3 illustrates an Internet network 50 and a wireless network 60. The Internet network comprises a web server 52 and a plurality of Internet stations 54, which are clients to the web server 52. The Internet network uses World Wide Web (WWW) protocols. The wireless network 60 includes a plurality of  
15 wireless terminals 64, each of which can access the web server 52 via a protocol gateway 62. These terminals are preferably hand-portable radio handsets. Communication between a wireless terminal 64 and the protocol gateway 62 is according to the Wireless Application Protocol (WAP). WAP specifies an application framework and network protocols for wireless  
20 terminals such as mobile telephones, pagers and personal digital assistants. WAP brings Internet content and advanced data services to wireless terminals. WAP can work across differing wireless network technologies and bearer types (GSM, CDMA, SMS). Communication between the web server 52 and protocol gateway 62 is according to WWW protocols.

25

- The wireless terminal differs from the Internet station in that generally it has a less powerful CPU, less memory, restricted power consumption, smaller displays and more limited input devices. The wireless network differs from the Internet network in that generally it has less bandwidth, more latency, less  
30 connection stability and less predictable availability. The WAP architecture is optimised for narrow bandwidth bearers with potentially high latency and is optimised for efficient use of device resources.

applications by creating extensions to WML and WMLScript. This allows the processing power of the terminal to be restricted, allows a standard WAP browser to be used and provides flexibility for new features.

5 Figure 4 is a schematic illustration of the operation of a browser application 100 in a terminal 2. The browser application provides the normal browsing functions provided by WAP up until this time but in addition provides other additional functions through the browser application such as email applications and news reading applications. The additional applications are  
10 provided by transferring content to the terminal. The content provides a hierarchy of decks which is used by the browser to emulate an additional application. The "master copy" of the content for emulating the additional application in the browser is stored and retained in the server. Any update or change to the content in the browser occurring during the use of the additional  
15 application must be communicated to the server so that the "master copy" of the content can be updated.

The figure includes the antenna 28 which communicates over the interface 30, the transceiver 3, the browser application 100, a cache memory 110 which  
20 may be part of the controller 4 or memory 16 in Figure 1, an arbitrator 120, an outbox 130, an outbox controller 140 and the input 24.

The transceiver 3 receives messages from the arbitrator 120 for transmission over the interface 30 and supplies messages 121 received over the interface  
25 30 to the arbitrator 120. The arbitrator 120 determines whether a received message is in response to a request from the browser (synchronous) or is not in response to a request from the browser but pushed from the server over interface 30 (asynchronous). An identifier in the messages transmitted over the interface 30 identifies whether the received messages are synchronous or  
30 asynchronous. The arbitrator 120 determines from the identifier whether a received message is synchronous or asynchronous and directs the received asynchronous messages 122 to the cache memory 110 and directs the

server. The messages are sent from the browser 100 to the outbox 130. The outbox 130 under the control of the enable/disable signal 142 provided by the outbox controller 140 can send the messages to the server via the interface 30. When the outbox controller 140 disables the outbox 130, the outbox buffers the messages 106. When the outbox controller 140 enables the outbox 140 the outbox 130 empties automatically and continues to empty automatically until disabled. When the outbox empties the messages stored there are transferred to the transceiver for transmission. The outbox controller 140 receives a input control signal 144 from the transceiver 3. This signal controls whether the controller 140 enables or disables the outbox 130. When the transceiver is able to communicate with the server over the interface 30 the input control signal 144 enables the outbox 130. When the transceiver is unable to communicate with the server over the interface 30 for example because the transceiver is disabled, the terminal is out of radio coverage of the server or the radio interface between the server and terminal is degraded, then the input control signal 144 disables the outbox 130 and the asynchronous messages 106 are buffered. The outbox can be controlled by adding new library calls to existing WMLScript functionality.

The input 24 when activated provides a signal which disable the transceiver 3. Disablement of the transceiver prevents communication over the interface 30 but does not otherwise affect the terminal. Thus the browser application may be used in situations where radio transmission is undesirable for example on an aeroplane. In particular it may be used to access the additional functions provided by the browser, for example, off-line email reading and composing, re-plying to previously received emails and off-line news reading. The actions undertaken while off-line which affect the "master copy" of the content used for emulating the active application(s) in the browser are stored as messages 106 in the outbox 130 and sent when the terminal comes on-line again.

30

Figure 5a illustrates a hierarchy of inter-linked items each of which contains content. The combination of items is used to emulate an application in a

means for accessing the remaining further items which provide the email application. The further items are accessed by reading them from the cache and if this is unsuccessful by transferring them over the interface 30.

- 5 Figure 5b is similar to Figure 5a and illustrates a hierarchy of items containing content. The items in combination provide the functionality of a news reader application. As previously a first item 160 provides user selectable links 161, 163, 165 to respective further items 162, 164 and 166. The item 160 and each of the further items 162 are each created from a so-called deck in WAP.
- 10 In this example the first item provides on the terminal display a list 170 of user selectable links 161, 163..165 each of which represents a news piece. Selection of a link accesses the appropriate further item and displays the text of the news piece on the display. Each of the links has two portions. A first text portion 172 gives a description of the link, in this case the date and news
- 15 headline of each news piece, and a second text portion 174 gives a visual indication of a parameter associated with that link. In this case the parameter indicates whether a link has previously been activated (R) to read the news piece or not activated (U).
- 20 Figure 6 illustrates the hierarchy of content items which co-operate to provide the functionality of an additional application to the browser. The "master copy" of this content is stored on the server. Each of the content items has an individual URL and can be accessed by the browser using the URL. Access in this context means that if the item is stored in the cache it will be read from
- 25 the cache using its URL and processed in the browser, and if the item is not stored in the cache, the browser will request the item using its URL from the server over the interface 30. The first item 160 is a deck called the Main deck and it identifies the other items and their URLs to the browser. The Main Deck 160 is accessed by first getting the Main Deck's URL. If the Main Deck is
- 30 stored in the cache the URL will be used to load the Main Deck from the cache otherwise the browser requests the deck from the server over the interface 30 using the URL. The Main Deck's URL may be got by selecting a



value of a parameter assigned in the second portion 204 of the Start Card 200. The links created by the second functions 216 are activated by the user selecting the link 161 displayed. Activation by the user causes the browser to access the defined content item in the second layer of hierarchy. The browser  
 5 first tries to load the content item from the cache and if unsuccessful requests its transfer from the server.

The Exit Card is accessed when the application entered through the Main Deck 160 and represented by the hierarchy of content items in Figure 6 is  
 10 exited. The exit card controls the creation of the asynchronous messages 106 which are sent to the outbox, and ensures that the "master copy" of the content items stored in the server representing the application are updated to reflect any modifications effected by the browser.

15 The Link Deck 230 comprises a first card 232 and a second card 234. The deck is called a link deck as each provides for access from the Main Deck 160 to a pair of further items in the third level of hierarchy, namely a WML Deck which is a deck comprising content such as an email or news piece, and a Storage Deck which is a deck storing parameters associated with the WML  
 20 Deck in the pair such as where the email or news piece has been read. The Link Deck 230 provides for access from the Main Deck 160 to the WML Deck 162 and the Storage Deck 260. The link deck 240 provides for access from the Main Deck 160 to the WML Deck 164 and the Storage Deck 262. The link deck 250 provides for access from the Main Deck 160 to the WML Deck 166  
 25 and the Storage Deck 264

In the link deck 230, the first card 232 is accessed when the function Call Init\_SCR1 in the second portion 204 of the Start Card 200 is activated. The browser attempts to access the card 232 using its URL from the cache, if it is  
 30 unsuccessful, the browser requests the transfer of the deck 230 comprising card 232 from the server. Once the card 232 has been accessed Init\_SCR1 in card 232 is activated which accesses the storage deck 260 using its URL

cache. Each portion 212 of the Option Card 210 creates a user selectable link and indicates the link on the display. The indication identifies whether the link has previously been activated which fact is derived from one of the parameter values.

5

The deck 162 when loaded in the browser creates a text message and a number of links which the user can use to return to the first level of hierarchy of the application or to leave the application altogether. A back option provides a link to the Main Deck using its URL. User selection of the link  
 10 makes the browser access the Main Deck 160. The main Deck 160 is then loaded into the browser from the cache using its URL or, if necessary, from the server using its URL. An exit option provides for an exit from the application and enter the main menu and a bookmark option allows the user to exit the application by selecting a bookmark which may represent another  
 15 application or a link to other content not related to an application. User selection of the exit option or a bookmark is detected as an event in the browser and an event handler is arranged to control the subsequent action. When the exit option is selected the Exit Card is accessed using its URL before the main menu is entered. When the bookmark is selected the Exit  
 20 Card is accessed using its URL before the content identified by the bookmark is accessed. When accessing the Exit Card 220, the browser first attempts to read the Exit Card from the cache 110 using its URL and if unsuccessful requests transfer of the Main Deck from the server and then reads the Exit Card 220.

25

The exit card 220 is used to keep the "master records" stored in the server in line with the records stored and updated in the browser. The storage decks 260 each store parameters which may vary during an application session. For example the parameter indicating whether a mail or news piece has been  
 30 read will change if the deck containing the email or news is accessed also a parameter may indicate that the user has chosen to delete a news piece or email.. The exit card creates a message 106 which identifies the new values

server, then it is not necessary for the terminal to be able to transmit to the server. The transceiver 3 could in this case therefore be replaced by a receiver.

- 5 When the server receives a new item for the application such as a new email it :-updates the Start Card 200 of Main Deck 160 by introducing a new entry to each of first and second portions 202 and 204; updates the Option Card 210 of the Main Deck 160 by introducing a new portion 212 having first and second function calls 214 and 216; creates a new link deck having an
- 10 individual URL and a first card accessible by the new entry in the second portion 204 of the Start Card 200 and a second card accessible on activating the link provided by the new portion 212 in the Option Card 210; creates new WML deck having an individual URL accessible via the second card of the link deck which stores the text of the new email; and creates a new Storage
- 15 Deck having an individual URL accessible for reading from via the first card of the link deck and accessible for writing to via the second card of the link deck which stores a parameter indicating that the email is unread. The server creates a message containing the updated Main Deck and pushes it asynchronously to the terminal. As an alternative, the server may create a
- 20 message for each of the new decks in the hierarchy formed and concatenate these messages and send the concatenated message asynchronously to the terminal.

The link decks de-couple the Main Deck from the WML Decks and Storage

- 25 Decks. The WML Decks may be replaced without adapting the Main Deck by adapting the relevant link decks. The link decks provide a standard interface to the Main Deck while allowing the structure of the second and third levels of the hierarchy to be varied without replacing the Main Deck.

- 30 Figure 7 shows an alternative embodiment of the terminal previously described with relation to Figure 4 and Figure 8 shows an alternative hierarchy of decks suitable for use in the browser 100 of Figure 7. The

and some could be static. It is also possible to have the whole inbox item as dynamic or static as well, which could be controlled by user.

For example, if the user receives an service indication on a regular basis, e.g.  
5 indication received on an application like number of received e-mails, this  
could be stored permanently in the inbox item. This means that a permanent  
storage could be done in a static part of the inbox item, i.e. it could be  
possible to reserve and/or un-reserve a location in the item inbox to a  
dedicated item. Elements in the static part should be installed or removed  
10 thorough a user access from the inbox item. Also, the static part could form a  
list of bookmarks, together with status information of e.g. number of service  
indications received and a URL address to the asynchronous application or a  
priority of user notifications.

15 As an alternative example, the inbox item could be dynamic, which could  
enable the user to delete/insert an indication an indication of an arbitrary item.  
When the user receives a new service indication, can it be further possible to  
arrange the service indications in a prioritised order, e.g. a First In First Out  
(FIFO) priority order. Naturally, the FIFO priority order could also be provided  
20 in the static part, as mentioned in the previous paragraph. If the inbox item  
comprises both dynamic and static parts, using a FIFO priority order, the static  
parts should typically have a higher priority than the dynamic parts, i.e. upon  
receiving a static part, the static part would preferably remove the dynamic  
part.

25

Any annex attached to this application forms part of the present description.

Although the invention has been described with respect to a particularly  
preferred embodiment, it should be appreciated that the invention as defined  
30 by the claims extends beyond the particular features of the embodiment  
described to encompass modifications and variations to the embodiment not  
necessarily described.

2. A system as claimed in any preceding claim wherein the first item, on transfer to the terminal, further comprises transfer means for transferring the further items from the server to the terminal for storage in a memory in the terminal where they may be accessed using their individual content identifiers.

5

3. A system as claimed in any preceding claim wherein the link means of the first item additionally has means for providing a visual indication of the link on the display and for providing for user activation of a displayed link.

10

4. A system as claimed in any preceding claim wherein access to the first item and further items by the browser includes attempting to read the item from a memory in the terminal and then, if unsuccessful, requesting transfer of the item from the server by sending a radio packet containing the appropriate content identifier and receiving in reply a radio packet or radio packets containing the item.

15

5. A system as claimed in any preceding claim wherein a content identifier is a URL.

20

6. A system as claimed in any preceding claim when dependent upon claim 2, wherein the transfer means transfers only those items which are not already stored locally.

25

7. A system as claimed in any preceding claim when dependent upon claim 2 wherein on transfer of the first item to the terminal the identifying means, link means and transfer means are activatable to establish a hierarchy of items.

8. A system as claimed in claim 7 wherein identifying means, link means and transfer means are activated automatically when the first item is transferred.

30

17. A system as claimed in any preceding claim wherein the terminal further comprises a AIM card and a SIM card reader for reading the contents of the SIM card, the SIM card storing the first content identifier.

- 5 18. A system as claimed in any preceding claim wherein the terminal further comprises means for creating content in association with an item and means for transferring the created content to the server.

10 19. A system as claimed in claim 18 wherein the created content transferred to the server updates the items stored there for future transfer to the terminal.

20. A system as claimed in any preceding claim when dependent upon claim 18, wherein the means for creating content creates a new further item which is then transferred by the means for transferring content.

15

21. A system as claimed in any preceding claim when dependent upon claim 18, wherein the means for creating content adapts the content of an existing item which is then transferred by the means for transferring content.

20 22. A system as claimed in any preceding claim when dependent upon claim 18, wherein the means for creating content creates content in dependence on the accessing of items by the browser.

25 23. A system as claimed in claim 22 wherein the means for creating content identifies that an item has been accessed.

30 24. A system as claimed in any preceding claim wherein pairs of the further items are associated, the first further item of the pair holding content for access by the browser and viewing by the user and the second further item of the pair storing content identifying a parameter associated with first item.

33. A system as claimed in any preceding claim wherein a further item when accessed by the browser has exit means for exiting the further item and simultaneously exiting the application.

5 34. A system as claimed in claim 33 wherein the exit means is an event handler activated by the creation of an event on exiting an item accessed by the browser.

10 35. A system as claimed in claim 2, wherein the terminal provided with a second item, arranged to give an indication, upon storage of an item in the terminal.

15 36. A system as claimed in claim 35, wherein said second item comprises at least a static part, and will reserve or un-reserve an indication for a dedicated item.

20 37. A system as claimed in claim 35, wherein said second item comprises at least a dynamic part, and will enable the user to delete/insert an indication an indication of an arbitrary item.

38. A system as claimed in claims 36 and 37, wherein said second item comprising both a dynamic and a static part.

25 39. A system as claimed in claim 35, 36, 37 or 38, wherein said second item is further arranged to handle the indications in a First In First Out (FIFO) priority order.

30 40. A system comprising at least one terminal and a server in radio communication therewith, the terminal comprising:  
a receiver arranged to receive radio packets from the server;  
a memory;

link means for automatically providing a link from the first item to each of a plurality of further items each link using an individual content identifier, wherein activation of the links provides for access to the further items and thereby the functionality of the first application, wherein the server is arranged  
5 to asynchronously transfer the first item to the terminal.

42. A method of providing the functionality of an application in a browser of a terminal by creating a hierarchy of inter-linked items by transferring the items over a radio link from a server, wherein entrance to said hierarchy is through a  
10 first item, accessible through the browser using a first content identifier, the first item identifying further items in the hierarchy accessible through the browser using content identifiers and providing for links to the further items using the content identifiers, comprising the steps of:  
initiating the application in the terminal by accessing the first item using its  
15 content identifier through the browser  
transferring the first item from the server to the terminal  
using the content identifiers of the further items in the first item to transfer the further items from the server to the terminal and  
creating links between the first item and the further items, whereby the  
20 functionality of the application arises from activation of the links.

43. A terminal, system or method substantially as hereinbefore described with reference to the accompanying figures and/or as shown in the accompanying figures.





Application No: GB 9913196.3  
Claims searched: 1 to 43

Examiner: Jared Stokes  
Date of search: 23 November 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H4L (LDGX, LDGP, LECX)

Int Cl (Ed.6): H04Q (7/22, 7/32)

Other: On-Line - WPI, EPODOC, JAPIO, INSPEC

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	WO 99/33293 A1 (Global) See abstract	-
A	US 5 895 471 (King et al.) See abstract	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.